IN THE U.S. PATENT AND TRADEMARK OFFICE

APPLICANT: Kazuyuki MATSUMURA et al.

SERIAL NO.: 10/051,115

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FOR: Ink Jet Printing Paper

GROUP: 1774

EXAMINER: SHEWAREGED, BETELHEM

D E C L A R A T I O N

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir,

I, Kazuyuki MATSUMURA, resident of c/o Silicone-Electronics Materials Research Center, Shin-Etsu Chemical Co., Ltd., 1-10, Oaza Hitomi, Matsuida-machi, Usui-gun, Gunma-ken, Japan do hereby declare that:

1. I was graduated from Faculty of Technology, Fukui University, Japan in March, 1989. Since April 1989, I have been employed by Shin-Etsu Chemical Co., Ltd., the assignee of the above-identified application. I have been engaged in research and development relating to silanes in the laboratory of the Company.

2. I am one of the named inventors of the above-identified application and hence, am familiar with the subject matter disclosed in said application.

3. In order to show the feature of the present invention, I conducted the following experiments.

[Experiments]

Comparison

On plain paper sheets having a basis weight of 64 g/m^2, each of the emulsions or aqueous solutions prepared in Synthesis Examples 1 to 7 of the specification of the present application was applied by means of a coater in a coverage of 10 g/m^2 and dried by passing through heating rolls. The resulting gel-coated paper sheets (Sample Nos. 1-7) were smooth on their surface.

Invention

The emulsions or aqueous solutions of Synthesis Examples 1 to 7 of the specification of the present application were diluted with water by a volumetric factor of 20. Paper sheets were made in the dilutions and passed between heating rolls for drying, obtaining printing paper sheets having a basis weight of 64 g/m^2. The resulting paper sheets impregnated with the emulsions or aqueous solutions (Sample Nos. 11-17) were smooth on their surface.

Next, using an ink jet printer BJC-430J (Canon Inc.) and color ink BC-21e, a color image was printed on the paper sheets. The state of paper after ink drying was observed. The criteria for rating the fixation of printed image, the water resistance of printed image, the dimensional stability of paper sheet to water and the curl property of paper sheet at various humid conditions are given below.

The results are shown in Table 1 for Comparison and Table 2 for Invention.

[Fixation of printed image]

After a printed image was formed with a magenta ink all over the paper sheet, a paper sheet is piled on the printed paper sheet by gravity to measure the time until the transfer of the printed image to the piled paper sheet was no longer caused and any spot was no longer formed. The time is evaluated as a fixing time.

◎: The fixing time is within 20 seconds.

○: The fixing time is from more than 20 seconds to 30 seconds.

△: The fixing time is from more than 30 seconds to 40 seconds.

×: The fixing time is more than 40 seconds.

[Water resistance of printed image]

A printed image was formed with a magenta ink all over the paper sheet. After the printed paper sheet was left to stand for one hour, it was immersed in city water for 10 seconds at 20° C. The sheet was taken out. After air drying, the water resistance was evaluated by the following criteria.

○: The printed image was not flown out to the space portion of the sheet, and no spots were present.

△: The printed image was slightly flown out to the space portion, and spots were observed a little.

×: The printed image was considerably flown out to the space portion, and considerable spots were present.

[Dimensional stability to water]

The dimensional stability to water of the sheet after air drying which was tested for the above-described water resistance was evaluated by the following criteria.

○: The dimensional change was little observed between the sheet before water immersion and the sheet after air drying.

△: The dimensional change was from 2 mm to 5 mm in average between the sheet before water immersion and the sheet after air drying.

×: The dimensional change was more than 5 mm in average between the sheet before water immersion and the sheet after air drying.

[Curl property of paper]

The curl property of the printed paper sheet was measured in the various conditions shown in Table 1 and 2 by the following criteria.

A: The absolute value of curl is from 0 mm to less than 5 mm, and the curl property is excellent.

B: The absolute value of curl is from 5 mm to less than 10 mm, and there is no problem in the practical use.

C: The absolute value of curl is more than 10 mm, and there is a problem in the practical use because poor conveyance may occur in a printer.

Table 1

Comparison

Sample No.	Emulsion or aqueous solution	Fixation of printed image	Water resistance of printed image	Dimensional stability to water of printed paper sheet	Curl property of paper in various humid conditions		
					15° C/10%RH	23° C/63%RH	30° C/80%RH
1	A	△	△	△	B	B	C
2	B-1	×	×	×	B	C	C
3	B-2	×	×	×	B	C	C
4	B-3	×	×	×	B	C	C
5	C	×	×	×	B	C	C
6	D	×	×	×	B	C	C
7	E	×	×	×	B	C	C

Table 2

Invention

Sample No.	Emulsion or aqueous solution	Fixation of printed image	Water resistance of printed image	Dimensional stability to water of printed paper sheet	Curl property of paper in various humid conditions		
					15° C/10%RH	23° C/63%RH	30° C/80%RH
11	A	◎	○	○	A	A	A
12	B-1	◎	○	○	A	A	A
13	B-2	◎	○	○	A	A	B
14	B-3	◎	○	○	A	A	A
15	C	◎	○	○	A	A	B
16	D	◎	○	○	A	A	A
17	E	○	○	○	A	A	B

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated this 21 day of June , 2004

Kazuyuki Matsumura